REMARKS

In response to the Official Action mailed on July 1, 2004, the application has been amended to add additional claims. No new matter has been added. Reconsideration of the rejections of the claims is respectfully requested in view of the above amendments and the following remarks.

Rejection 1

On page 2 of the Official Action, claims 1 - 10 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as unpatentable over claims 12 - 31 of copending Patent Application No. 10/666,129.

This provisional rejection is respectfully traversed. Claims 1 - 10 of the present application each include at least one component (Co, for example) not included in any of the claims of 10/666,129. The Official Action has not shown any motivation for a person skilled in the art to modify the compositions claimed in 10/666,129 to supply the missing element(s), or indeed any teaching that could be combined with the claims of 10/666,129 to supply the missing element(s) to result in the compositions of claims 1 - 10. As such, the rejection fails to meet the requirements for setting forth a *prima facie* case of obviousness and thus is improper. Withdrawal of the provisional rejection is respectfully requested.

Rejections 2 and 3

On page 3 of the Official Action, claims 1 - 3, 5 - 6, and 8 were rejected under 35 USC 103(a) as unpatentable over JP 2001-205476, and claims 1 - 6 and 8 were rejected under 35 USC 103(a) as unpatentable over JP 55-20403. It is the position of the Official Action that each of the references contains a generic disclosure which encompasses the specific compositions claimed in the rejected claims, and that any individual composition falling within either of those generic disclosures would be obvious.

These rejections are respectfully traversed. A first error in the rejections is that the disclosure of JP 2001-205476 does not in fact encompass the claimed compositions. A second error in the rejections is that the generic disclosures in these references describe such a vast number of compositions that they provide a person skilled in the art no motivation to select the specific compositions set forth in the claims. (In discussing the two cited references, the original Japanese texts will be relied upon, since the computer translations prepared by the Japan Patent Office are notoriously unreliable and generally ungrammatical).

Regarding the first error, claim 1 of the present application describes a lead-free solder including Cu, Co, optionally Ni, and a remainder of Sn. JP 2001-205476 does not disclose or suggest such an alloy, either generically or specifically.

JP 2001-205476 discloses an alloy brazing material for use in assembly of a semiconductor device such as a transistor or an

IC. The alloy has Sn as a primary component, preferably also includes Ag, and further includes a third element which can form an intermetallic compound with Sn which has a breakdown temperature above the melting temperature of Sn. The maximum particle diameter of the intermetallic compound which is formed is 5 - 80 μm.

This reference never contemplates adding more than a single element to the Sn(Ag) base which forms the alloy. This is why JP 2001-205476 repeatedly refers to the component of the composition other than Sn and Ag as "the third element". For example, paragraph 017 of the Japanese reads in part, "However, if the added amount of Ag exceeds 3.5%, it bonds with Sn to form an intermetallic compound, so even if **a third element** is added ....". In addition, paragraph 018 read, "**The third element** which is added can basically be ...". Furthermore, paragraph 021 begins with the words, "However, when **this third element** is added, if the added amount is less than 0.1 %...". The fact that JP 2001-205476 contemplates adding no more than one element besides Ag is also shown by the fact that all of the examples in this reference are of a ternary alloy (an Sn-Ag-Te alloy).

The exclusion of anything except a binary or ternary alloy from the disclosure of this reference is also clear from claim 2, which reads as follows:

> An alloy brazing material as claimed in claim 1 characterized in that **any one of** Au, Cr, Co, Cu, Ni, Pd, Pt, Rh, Se, and Te is used as the element having a higher breakdown temperature than the melting point of Sn.

In Japanese patent practice, the language "any one of" before a list of items in a claim is closed-ended language which excludes the presence of more than one of the listed items. In Japanese practice, in order for a claim to encompass more than one item in a list, the claim must use specific language to this effect, such as is done in claim 2 of JP 55-20403 (the other reference cited in the Official Action), which includes the language "characterized in that the composition includes, in weight %, **one or two or more** of Au 10 - 85%, ...".

Thus, there is no contemplation in JP 2001-205476 of adding more than a single one of Au, Cr, Co, Cu, Ni, Pd, Pt, Rh, Se, and Te to an Sn(Ag) base alloy, and so no contemplation of an alloy containing both Cu and Co, for example, or Cu, Co, and Ni as set forth in claim 1 of the present application.

Although the English language abstract for JP 2001-205476 in the Patent Abstracts of Japan describes the reference as disclosing an alloy brazing filler metal which "contains elements having a decomposing temperature high than.....", the use of the term "elements" is a clear mistranslation, for there is no corresponding disclosure in the Japanese text. Taking the disclosure of the reference as a whole, a person skilled in the art and in possession of a proper translation of the Japanese text could only conclude that what JP 2001-205476 discloses is, as set forth above, a Sn(Ag) base alloy containing one and only one of Au, Cr, Co, Cu, etc. It is also to be noted that the English abstract in the Patent Abstracts of Japan is not part of the original disclosure of JP 2001-205476 but is a document created by a third party. It is not known when this abstract was published, and there is no indication that the English abstract is in fact prior art as to the present application.

Thus, it is clear that JP 2001-205476 does not include any disclosure which encompasses the composition set forth in claim 1.

Even if the disclosure of JP 2001-205476 were to be viewed, merely for the sake of argument, as encompassing a composition including anything more than an alloy with a Sn(Ag) base and a single additional component, the disclosure would not suggest to a person skilled in the art the specific composition set forth in claim 1, on account of the vast number of compositions which the disclosure would then cover.

According to paragraph 018 of JP 2001-205476,

> The third element which is added can basically be any element which can form an intermetallic compound having a breakdown temperature which is higher than the melting point of Sn. For example, as elements which can form an intermetallic compound with Sn, there are Au, Ba, Ca, Ce, Co, Cu, Fe, La, Li, Mg, Mn, Ni, Pr, Pt, Rh, Se, Sr, Te, Ti, Zr, and the like.

Paragraph 018 further states that it is preferable to add an element having a lower affinity for oxygen, i.e., which oxidizes less readily than does Sn so that when the brazing material is manufactured or used, the added element will not preferentially oxidize and lose its effect.

Paragraph 020 states that out of the above-described listed elements, examples of elements which oxidize less readily than Sn are Au, Cr, Co, Cu, Ni, Pd, Pt, Rh, Se, and Te. Of these elements, Te is preferred.

Thus, in paragraph 018, JP 2001-205476 lists 20 different elements, in addition to Ag, as examples of elements which can be added to its alloy as the third element, and in paragraph 20, it lists 10 different elements as preferred examples of those 20 elements which can be added. This means that if JP 2001-205476 in fact disclosed the use of any possible combination of these elements, as asserted in the Official Action, then it would disclose 2046 unique combinations of elements, just in the form of combinations using the above-described preferred elements mentioned in paragraph 020, and it would disclose 2,091,150 unique combinations of elements selected from the large list of possible alloying elements set forth in paragraph 018.

As such, the situation of claim 1 of the present application with respect to JP 2001-205476 is completely analogous to the situation in In re Baird, 29 USPQ2d 1550, 1552 (Fed. Cir. 1994), in which the PTO had rejected a claim to a specific chemical composition based on a reference which disclosed a generic formula. While the formula encompassed the claimed composition, it also encompassed millions of other compositions, and the reference failed to suggest the specific claimed composition. The Federal Circuit reversed the rejection on the basis that the fact that a claimed substance may be encompassed by a disclosed generic formula does not by itself render that substance obvious. That decision makes clear that it is inadequate for a reference to merely disclose a generic formulation describing a vast number of choice which happen to include a claimed composition. Rather, there must be teachings in the reference that suggest selecting the specific composition set forth in a claim.

As such, in order for the alloy recited in claim 1 to be obvious, there must be some specific suggestion in JP 2001-205476 to select this combination of alloying elements from the enormous number of possible combinations covered by its generic disclosure. Since this reference contains no such suggestion, JP 2001-205476 cannot render claim 1 or claims 3, 5 - 6, or 8 which depend from it obvious.

For the same reason, the rejection based on JP 55-20403 is erroneous. This reference discloses a brazing material for use in connecting external parts of a watch. The brazing material comprises 10 - 85% Au, 15 - 90% Sn, and it may further include one or more of Ni, Ag, P, Co, Ca, Mn, Rd, Pt, Ph, Sb, Se, and Te. This generic description covers 2047 unique combinations of these alloying elements, and yet the only specific compositions which the reference discloses are an Au-Sn binary alloy, an Au-Sn-Ni alloy, and an Au-Sn-Mn alloy. There is nothing in this reference to guide a person skilled in the art to select a Sn-Cu-Co-(Ni) composition as set forth in claim 1 of the present application from the 2044 other compositions encompassed by its generic disclosure. Just as is the case with JP 2001-205476, the alloy recited in claim 1 cannot be obvious without some specific suggestion in JP 55-20403 to select this combination of alloying elements from the myriad choices which it generically discloses. As JP 55-20403 is lacking any such suggestion, it cannot render claim 1 or claims 2 - 6 and 8 which depend from claim 1 obvious.

Concerning claim 6, the Official Action acknowledges that JP 55-20403 does not teach a composition containing Ag in the amount set forth in claim 6. Specifically, claim 6 specifies that the content of Ag is 0.05 - 2%, whereas the content of Ag is specified in JP 55-20403 as being a minimum of 3%. The Official Action states that a *prima facie* case of obviousness exists where the claimed range and prior art do not overlap but are close enough that one of ordinary skill in the art would have expected them to have the same properties. The error in this argument is its unsupported assertion that a person skilled in the art would have expected an alloy having an Ag content of 2% but otherwise the same as that of JP 55-20403 to have the same properties as one having an Ag content of 3%. The only way that a person skilled in the art could draw such a conclusion would be if he were to completely ignore the reference which the rejection relies upon, since page 10, upper right column - lower left column of the Japanese text of JP 55-20403 states that "With less than or equal to 0.1% Ni, 0.1% Cu, 3% Ag, ... the effect on increasing strength is small...". This is a clear teaching that an alloy with a content of less than 3% does not have the same properties as one having a content of greater than 3%. To set forth a *prima facie* case of obviousness, the Official Action must show some specific motivation in the references to modify them, not simply rely on a per se rule while ignoring the teachings of the reference that modifying the reference does in fact produce a change in properties. Since the reference provides no motivation to modify its composition but on the contrary teaches away from a composition containing 3% or less Ag, the Official Action fails to set forth a *prima facie* case of obviousness with respect to claim 6.

Rejection 4

On page 4 of the Official Action, claims 7, 9, and 10 were rejected under 35 USC 103(a) as unpatentable over the references as applied to the claims in the preceding rejections and further in view of the description on page 3 of the present application of certain conventional lead-free solders which are said to be capable of preventing copper leaching. This rejection is respectfully traversed.

The premise of this rejection is that the cited Japanese references supposedly disclose the features substantially as claimed except for the uses set forth in claim 7 and 9 - 10. That premise is incorrect. As explained in the previous paragraphs, there is nothing in the cited references that would guide a person skilled in the art to select the alloy composition set forth in claim 1 from the literally thousands of possible compositions encompassed by the generic descriptions in the cited references. As a result, the claimed composition cannot be obvious. Since the composition of claim 1 itself is not obvious, use of that non-obvious composition cannot be obvious.

The rejections of claims 7, 9, and 10 are further erroneous because even if the cited references did suggest the alloy composition set forth in claim 1, there is nothing in the references that would suggest using such an alloy to coat an end of a wire.

The brazing material disclosed in JP 2001-205476 is described solely as being useful for the assembly of a semiconductor device such as a transistor or an IC in which, as shown in Figure 2 of that reference, the brazing material forms a layer 2 between and joining a silicon chip 1 and a substrate 3. There is nothing in this reference that remotely suggests the possibility or any advantage to using any of the alloys which it generically discloses to coat an end of a wire.

The brazing material disclosed in JP 55-20403 is described solely for use in joining external parts of a watch to each other, such as to join a watch band to a watch case, or to join a pipe for receiving a winding stem to the watch case. Again, a person skilled in the art would find no teachings in JP 55-20403 to suggest using the materials generically encompassed by this reference to coat an end of a wire.

In particular, every alloy disclosed in JP 55-20403 is an Au-based alloy containing a minimum of 10% and up to 85% of Au. In contrast, the only one of the conventional alloys mentioned on page 3 of the present application which contains any Au is the alloy disclosed in JP 2001-121286, which is an Sn-Cu base alloy which may additionally contain Ag, Ni, and very minor amounts of Ge and/or Au. As can be seen from Table 3 of that reference, none of the alloys disclosed therein contains more than 0.010% of Au, which is a mere 1/1000th of the minimum level of Au required of the alloys disclosed in JP 55-20403. No person skilled in the art would see any resemblance between the alloys disclosed in JP

55-20403 and the conventional alloys disclosed on page 3 of the present application and thus could not find any motivation from the present application to employ any of the alloys disclosed in JP 55-20403 to coat an end of a wire.

As described on page 4 of the present application, it was discovered by the present inventors that Co is extremely effective for preventing copper leaching when it is added to a Sn-Cu alloy and that the addition of Ni to the resulting Sn-Cu-Co alloy further diminishes copper leaching. These findings are not at all intuitive, since it might be thought that only the addition of Cu to a solder would have an effect on copper leaching. Nevertheless, as shown in Table 1 on page 8 of the present application, the addition of Co and optionally Ni to a Sn-Cu alloy has a dramatic effect on reducing copper leaching. Compare, for example, Run No. 12 of Table 1 (A Sn-Cu alloy) with Run Nos. 1, 2, 5, 6, 9, and 10, all of which have the same Cu content as Run No. 12 but also include Co and optionally Ni. All of the runs which include Co and optionally Ni have a copper leaching speed which ranges from 51% down to 40% of the copper leaching speed of Run No. 12, indicating a remarkable decrease in copper leaching. None of the cited references provides any suggestion of these very pronounced effects of Co in a Cu-containing solder when used to coat the end of a wire, and a person skilled in the art could find no motivation in the references to use any of the alloys generically disclosed by the references for this purpose.

On page 5, the Official Action cited *In re LaVerne*, 108 USPQ 335 (CCPA, 1956) for the proposition that "a use of a new material in an old patented process in not invention". This is one of those old adages, long defunct, which courts used to rely upon, but it does not represent the current state of the law. *In re LaVerne* is not so much as mentioned in *Chisum on Patents*, the definitive work on modern patent law, and the Federal Circuit does not appear to have ever relied upon this case. It states a *per se* rule instead of relying on objective evidence, and it ignores the requirement that the prior art or the knowledge generally available to one skilled in the art provide some objective teaching that would lead a person skilled in the art to combine the relevant teachings of the references. In re Fine, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). An objective analysis of the references, as described above, shows that neither of the cited references contains the slightest inkling of the advantages or even the possibility of using a Co-containing alloy to coat the ends of a wire. As such, they contain no teachings that could be combined to result in the uses set forth in claim 7, 9, and 10.

New claims 11 - 17 describe additional features of the present invention. These claims are allowable as depending from claim 1. Claims 11 - 13, which use the transition language "consisting essentially of", specifically exclude the presence of Au in an amount such as that disclosed in JP 55-20403 which would materially affect the basic and novel characteristics of the invention defined by these claims.

In light of the foregoing remarks, it is believed that the present application is in condition for allowance. Favorable consideration is respectfully requested.

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Date: Nov 1, 2004